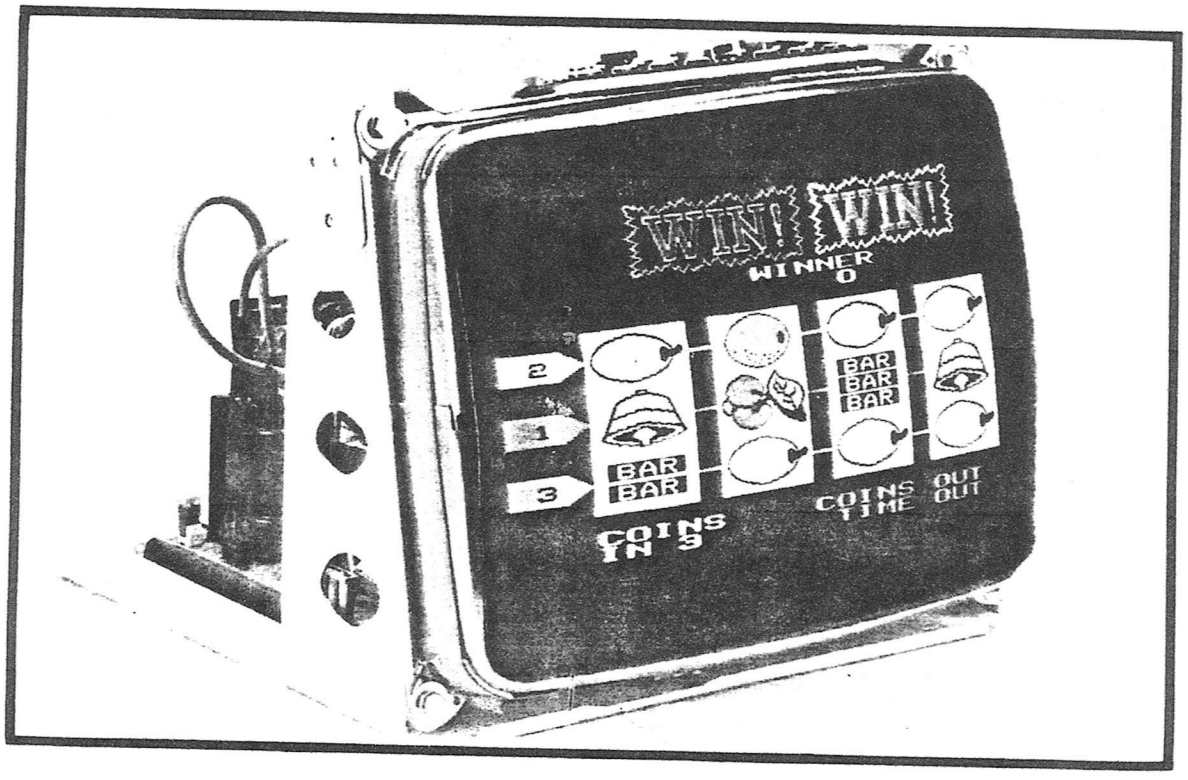
THEORY
INSTRUCTIONS
MAINTENANCE



MODELS
RGB 1401A,1701A & 2501A

RGB
DISPLAY CORPORATION
22525 KINGSTON LN · GRASS VALLEY CA 95945

INNOVATION FOR THE WORLD OF COMPUTER COLOR GRAPHICS

RGB-1401 COLOR MONITOR
SET-UP PROCEDURE

1. Plug video monitor AC and video cable in. Allow monitor to warm up for at least 15 minutes.

2. Adjust screen voltage trim pot, located on flyback transformer (lower pot), to obtain full raster.

3. Adjust vertical size and vertical position trim pots on top of monitor.

4. Adjust horizontal width coil located on main PC board for desired width.

5. Adjust horizontal centering trim pot on top of monitor for center.

6. Turn RED, GREEN and BLUE bias controls located on top of monitor, 1/4 turn clockwise, facing monitor. Operate set-up switch to set-up mode.

7. Adjust screen voltage trim pot, located on flyback transformer (lower pot), to optain a just visible line (color of line is not important).

8. Adjust RED bias trim pot on top of monitor for a just visible line.

   Adjust BLUE bias trim pot on top of monitor for a just visible line.

   Adjust GREEN bias trim pot on top of monitor for a just visible white line.

9. Return set-up switch on top of monitor to normal operating mode.

10. Adjust master gain trim pot on top of monitor for desired brightness.

11. Adjust focus control, located on flyback transformer, (upper pot) for best overall picture sharpness.

THIS COMPLETES THE SET-UP PROCEDURE

THE PROCEDURE SHOULD BE FOLLOWED TO OBTAIN OPTIMUM MONITOR PERFORMANCE AND TO MINIMIZE PHOSPHOR BURN-IN AND X-RAY EMISSION

SETUP PROCEDURE FOR RGB 1401 DISPLAY

The setup procedure for the RGB-1401 is relatively simple. It parallels the setup of a standard television set for color balance, gain balance and convergence.

A. SAFETY CONSIDERATIONS:

CAUTION: VERY HIGH VOLTAGES ARE PRESENT INSIDE THE MONITOR AND THEY CAN KILL YOU. ALSO, ALL PICTURE TUBES CONTAIN A HIGH VACUUM, AND WHEN BROKEN, WILL SCATTER PIECES OF GLASS LIKE A SMALL HAND GRENADE. I RECOMMEND YOU USE CARE (and safety glasses) WHEN WORKING INSIDE THE MONITOR.

AN ISOLATION TRANSFORMER IS SUPPLIED, AND IS MANDATORY FOR SAFETY. DO NOT ATTEMPT TO USE UNIT WITHOUT THE ISOLATION TRANSFORMER, AS THE 1401 POWER SUPPLY CONNECTS ONE SIDE OF THE INPUT POWER LINE DIRECTLY TO THE CHASSIS. FAILURE TO USE AN ISOLATION TRANSFORMER MAY ALSO RESULT IN DAMAGE TO THE UNIT OR TO YOUR COMPUTER.

B. POWER SUPPLY:

The monitor requires an isolation transformer to eliminate a "hot chassis". The power supply uses series regulators and maintains the DC supply at 2.5, 5.0, 12.0, 16.0 and 122 volts. All voltages should be at or near their design levels before beginning other work on the unit.

C. DISPLAY SIZE AND POSITIONING:

1. Adjust height control for approximately 90 percent vertical size.

2. Adjust vertical position control for vertically centered display.

3. Adjust horizontal position control for horizontally centered display.

4. If any of the above adjustments do not function properly, check the remote control board and cable for damage. The width coarse adjustment is coil L152 in the horizontal deflection circuit.

D. PURITY ADJUSTMENT:

Purity adjustments should not be done unless a solid red or solid yellow screen shows some other color, usually in one of the corners of the screen. If you can display a uniformly red screen, you can skip instructions 1-8 and proceed to step 9.

1. Turn down the blue and green gain controls and increase the red gain to produce a RED raster. You may have to adjust the CRT screen drive control (dime-sized plastic control located on the CRT socket-board, or on later models, the lower white plastic shaft on the hight voltage transformer) to get a red raster. Ideally, the gain controls should be in mid-range, with the focus and screen drive set for best display image.

2. If the screen is uniformly red all over, then your purity adjustments are properly set. If only the corners are some other tint (or in extreme cases, an entirely other color), then you can skip steps 3-8 and proceed directly to step 9. It should be very rare that steps 3-8 need be done, and then probably only after the monitor has been dropped or otherwise badly jarred.

3. If you are here, then it is assumed that the red screen is some other color, especially in the center of the screen. This may have resulted from movement of the yoke or of the electrodes inside the neck of the cathode ray tube (CRT). The following steps assume that the CRT has not been damaged and that at one time the monitor was in proper adjustment. Loosen the deflection yoke screw and break the yoke free from the silicon rubber where it is glued to the rubber wedges and the CRT. If there are any thin clear plastic stips with magnets on the end of them fastened to the bell of the CRT and located under or near the yoke, remove them at this time. Do NOT remove the small magnets that are

actually glued to the rim of the yoke itself (normally located near the rubber wedges). See figure 1.

4. Move the deflection yoke back and forth and be certain that the resulting vertical reddish blob is at the horizontal center of the screen. See figure 2. If necessary, adjust the purity ring (magnets) to center the red bar. The final position of the yoke should be relatively close to the bell of the CRT (away from the small end of the bell of the CRT. Note: The convergence and purity rings are locked in place by a locking ring which must be unscrewed slightly to release the purity and convergence adjustment rings (See figure 1). Also, when adjusting the yoke position, never touch the adjusting magnets other than the purity ring except in obvious case of need.

5. Slide the yoke backwards (towards CRT rear) to produce a uniform red raster. As you move the yoke, the red blob (which starts out 2 to 4 inches wide) should "bloom" outward until it fills the screen from left to right and top to bottom. At this point you should tighten the yoke locking screw slightly. See figures 1 and 2.

6. Turn up one color at a time and check for uniform rastor which is consistent on all colors.

7. If necessary, repeat steps D.3 - D.5 above.

8. Tighten yoke in position. You may wish to temporarily re-affix the yoke to the wedges and CRT cone with tape — do not reglue yoke to CRT at this point.

E. STATIC CONVERGENCE:

9. Adjustment of static convergence requires movement of the convergence magnet rings, which should be a rather rare requirement for a monitor that has not been dropped. It is recommended that you first examine steps 10-14 without actually making any adjustments to the unit. You may find that you can skip steps 10-14 and proceed directly to step 15. In any event, however, you need to display a white cross-hatch signal from a test generator or the CPU.

10. Set screen drive and RGB gain control to produce a fine-line crosshatch. Adjust the focus control for the best focus at the middle if the screen, with consideration given to the resulting focus at the four corners of the screen.

11. Loosen the plastic nut of the color purity adjustment ring assembly by turning counter-clockwise. You may have to break the yelloy paint-seal to do this. Note: It is wise to first use a sharp knife or razor blade to scribe a "score line" across the adjustment rings in order to have a point of reference in case you need to return to your starting point! See figure 1.

12. Adjust the 4-pole magnets to converge the red and blue vertical and horizontal lines at the center of the screen. (See Figures 3 and 4, respectively).

13. Adjust 6-pole magnets to place the red and blue lines converged vertically and horizontally on the green lines. (See Figure 5.)

14. If necessary (and it will be - there is substantial interaction between the various rings), repeat steps 12 and 13 above until the the best possible convergence is obtained. Note that the convergence at the extreme corners will be "trimmed up" in subsequent steps. When you are satisified with the display, tighten the plastic locking nut of the color purity adjustment ring assembly by turning clockwise.

F. PERIPHERAL CONVERGENCE:

15. Adjustment of peripheral convergence requires movement of the yoke, which should be a very, very rare requirement for a monitor that has not been dropped. It is recommended that you first examine steps 16-18 without actually making any adjustments to the yoke. You may find that you can skip steps 16-18 and proceed directly to step 19 or 20, as appropriate. However, to examine steps 16-19 you will need to display a white cross-hatch signal from a test generator or the CPU.

16. Observe the horizontal lines at the center of the screen as shown in figure 7. If the red and blue horizontal lines are shifted crossing with the green horizontal lines, converge them by swinging the yoke vertically. Then confirm that the vertical lines at the screen center are also converged. Note: if this step is necessary, you may have to free the yoke from the rubber cement which holds it to the rubber wedges and the CRT.

17. Observe the vertical lines at left and right center of the screen as shown in Figure 8. If the red or blue vertical lines are shifted against the green vertical line, converge them by swinging the yoke horizontally. Confirm that the horizontal lines at the top and bottom centers of the screen are also converged.

18. Being careful to not move the yoke from the position obtained in the above steps, carefully position the three rubber wedges between the CRT and the deflection yoke.

19. At this point the monitor coarse convergence adjustment is completed. It is suggested that you reexamine the display per steps 1-8 and 17-18 above before proceeding. It is possible that you may wish to go back over the procedure to make any last minute minor adjustments.

20. After you confirm the position of the yoke is proper, secure the wedges to the yoke and CRT with a good grade adhesive such as a silicon rubber compound.

G. COLOR TEMPERATURE AND FOCUS:

21. Set the setup switch (on the remote control board) to "setup" position. You should get a faint gray line (or some other tint, if unit is mis-adjusted) across the middle of the screen.

22. Set gain control (on remote control board) to minimum.

23. Set RGB bias controls (on remote control board) to just below mid-position.

24. Adjust screen drive control (dime-sized plastic knob on CRT socket board on some models, lower white plastic shaft on the high voltage transformer on later models) for a faint horizontal line. (Note: This particular adjustment normally is only necessary one time — once set, it should not be necessary to re-do it unless some material change is made to the CRT or the electronics board.)

25. Adjust the Red, Green, and Blue bias controls (on remote control board) as follows:

a. Turn all controls down until line disappears.

b. Turn each control back up until line just reappears.

c. At this point the line should be relatively faint with a definite gray tone. If it appears any other tint, re-adjust the appropriate controls to obtain a gray line.

26. Set the setup switch to the "normal" position. The unit will now take about 30 seconds to return to normal operating status. If a signal is present, it will all be in one bright line across the center of the screen. This is normal, and you will see it expand to normal size at the end of the 30 seconds.

27. Adjust the other four controls on remote control board for picture size, position and gain (brightness).

28. Display a test pattern and adjust the focus control (white plastic shaft, located at left-rear of unit on the high-voltage transformer) for best over-all display.

H. SETTING BORDER SIZE

29. Display a full-screen image that includes a border to the very edge of the screen (the BASIC command "SCREEN 0:COLOR 10,1,6:CLS" will do this).

30. Use the horizontal position control to shift the display to the left until the right edge of the screen shows the black blanking area. If the right edge of the screen seems to be too light for the rightmost 1/8 to 1/4 inch or so, and if this light area appears and disappears as you shift the screen left and right, then the displayed image is too narrow. Using a non-metalic hex adjustment tool, adjust the horizontal width control (located on the left-front of the main electronic board, just by the fuse, as viewed from the top front of the monitor). By making the displayed area wider (the border less wide, the light area should disappear.

H. FINE TUNING

This concludes the coarse adjustment procedures. To improve the display from this point involves trial-and-error placement of small magnets on the end of plastic strips around the CRT at the face of the yoke to modify the relative position of the RGB electron beams with reference to each other and their respective phosphers on the CRT face.

31. There are actually two types of trim magnets. The first consists of small pieces of brown magnetic plastic glued on the end of short pieces of celluloid. The second are actually small pieces of silicon steel (a magnetic shunt, so to speak) instead of actual magnetic pieces. Both are used, with the shunts less often than the others. You can make your own trim magnets, or they are available at very low cost. In any event, you can re-use the ones that came with your monitor, provided that you renew the adhesive foam on them.

32. Assuming that you have several trim magnets, start by displaying a white full-screen crosshatch pattern of about 1 inch or so squares. By visualizing the face of the CRT as a clock, you will place these trim magnets around (and probably also underneath) the front of the yoke as follows:

33. Looking at the 10:30 position of the screen (upper left), experimentally (without actually sticking it down) move one of the trim magnets around the bell of the CRT by the rubber wedge that holds the yoke in place. You should try positions on, above, behind and by the rubber wedge. (Some perverse law must state that the wedge is always "just where the magnet should be!") At some spot you should see the displayed image at 10:30 get either better or worse. By experimenting with different magnets and different positioning, you can cause the convergence in this area to get "right-on". Assuming that you need to, affix (very gently, as you may wish to move them later) the trim magnets needed to make this area sharp.

34. Now adjust the areas at 9:00, 7:30, 1:00, 2.30, 3:00, and 4:30 as needed, and most likely in that order, since the top and left of the screen is the most critical for average viewing purposes. In any event, note that there is substantial interaction between the trim magnets. Also note that if you do use one of the shunts, that it will substantially "overpower" any trim magnets in the immediate vicinity, as the shunt is much more active than the magnets.

35. Repeat steps 33 and 34 until you have the best possible cross hatch pattern. Then display a screen-full of upper and lower case "M"s and "N"s, with a few "(" and ")" in different colors. Then repeat steps 33-35 until the display is the best obtainable. Note: The further underneath the yoke a magnet or shunt is, the harder it is for other magnets to compensate for the "deep" magnet or shunt, so when adjusting one area of the screen, remember to look at what is happening to adjacent (and even on the other side) areas of the screen.

At this point you have completed the adjustments available to the average user. A screen-full of white letters should appear white, with very little color fringing of the letters. If you wish to have the factory re-converge it, please contact me for details.

11/20/82

Figure 1

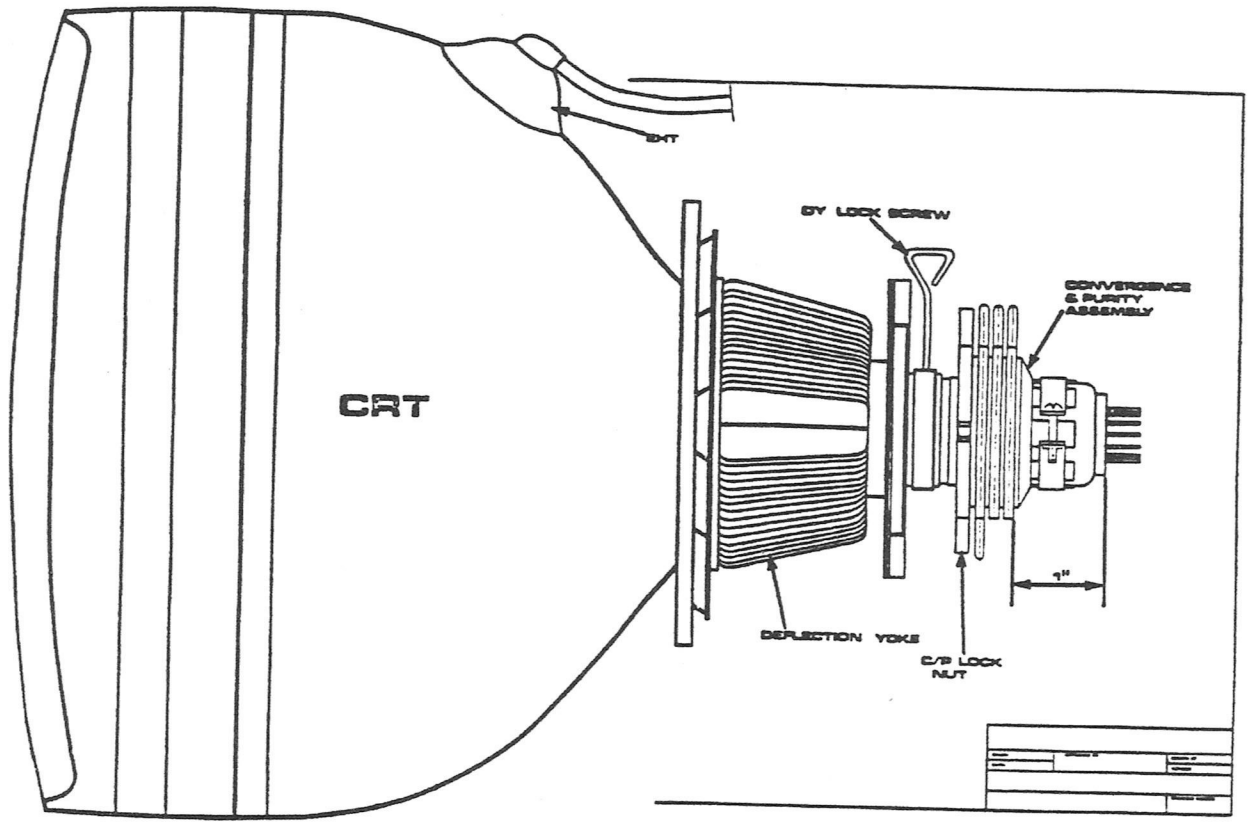
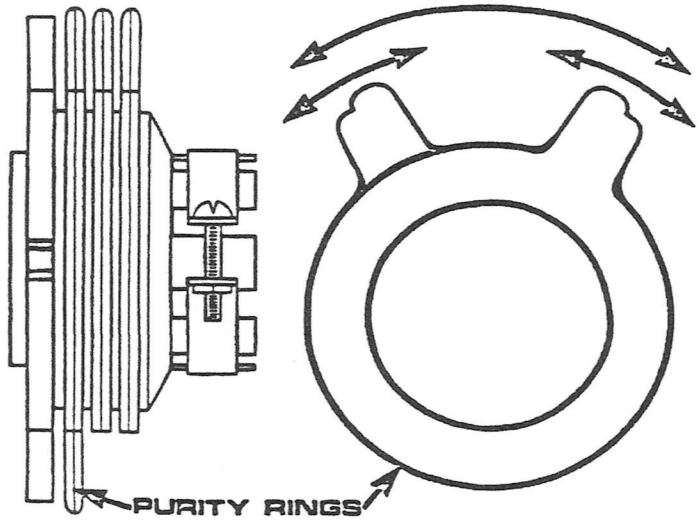
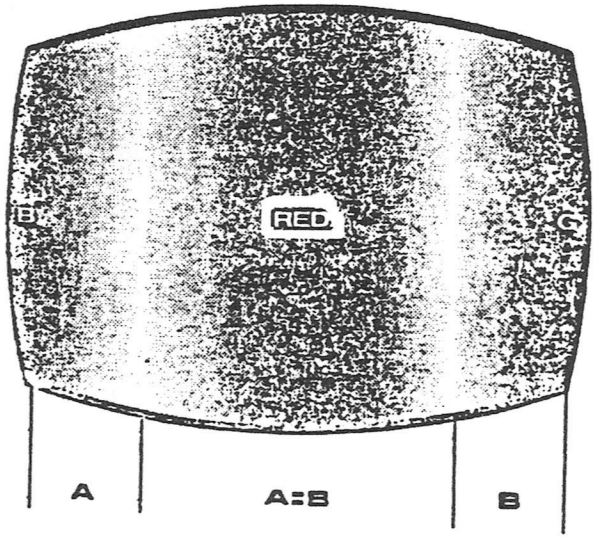


Figure 2





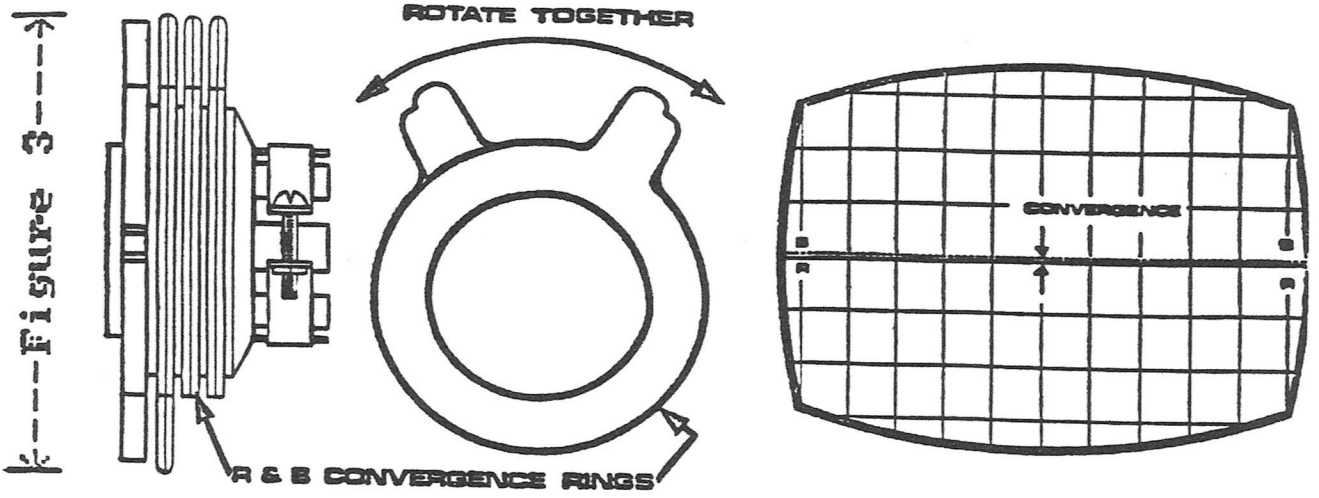


Figure 3

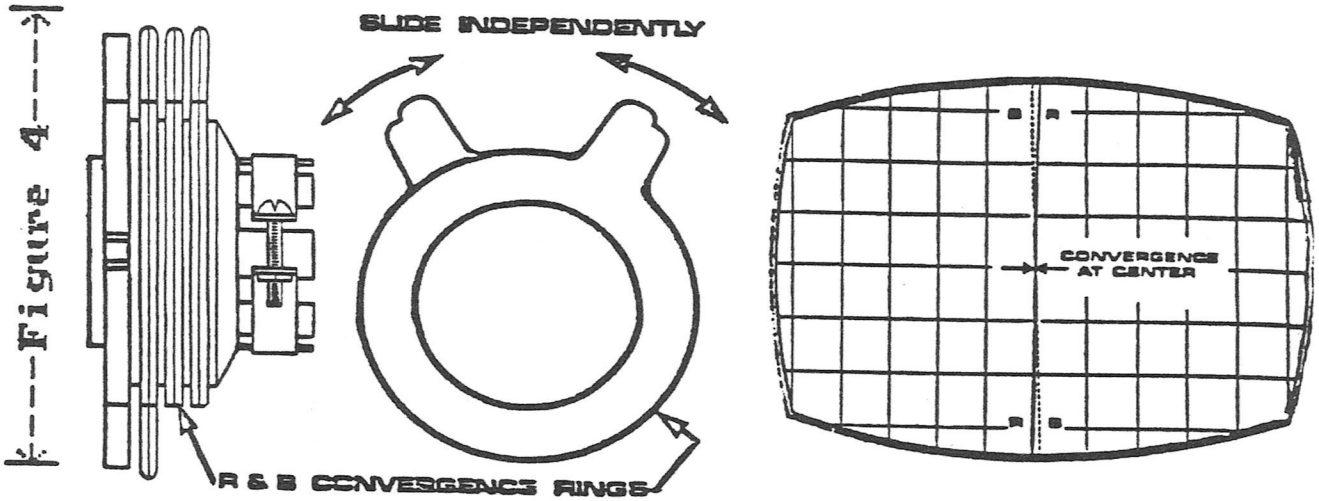


Figure 4

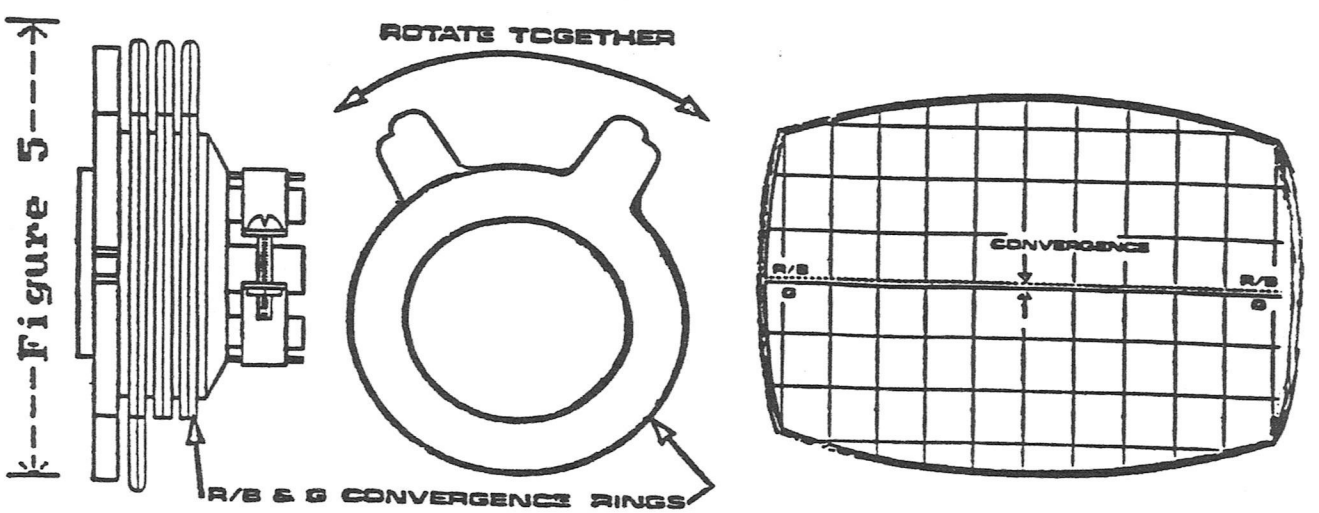
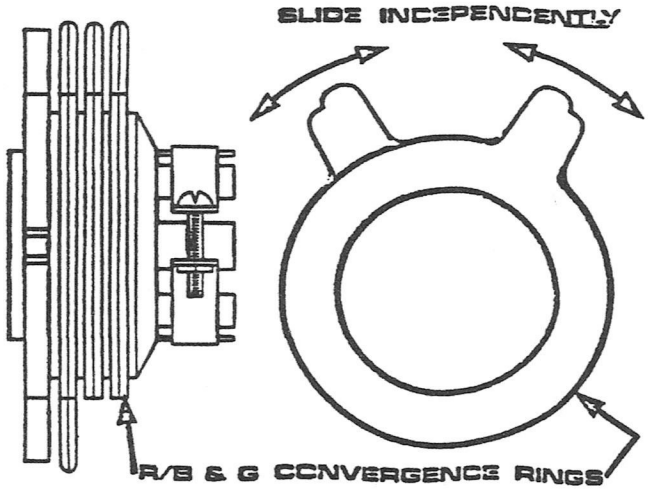


Figure 5

Figure 6



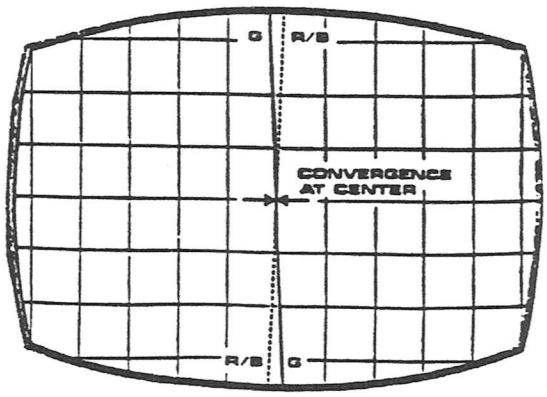
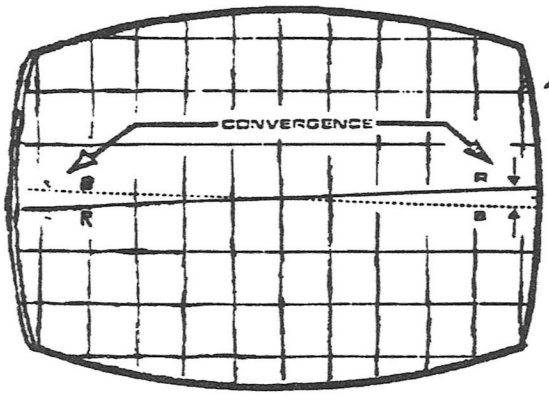
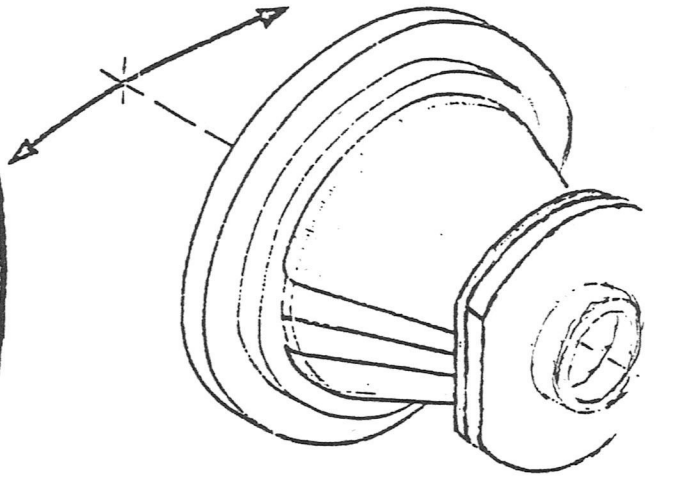


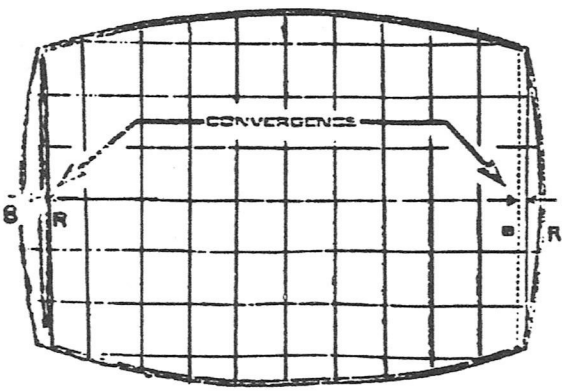
Figure 7

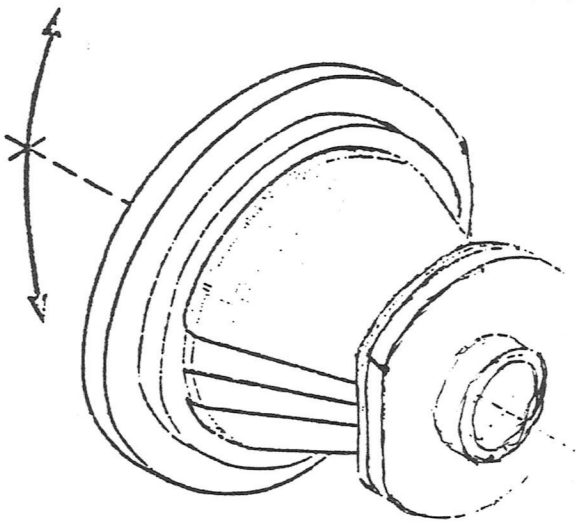




SWING HORIZONTALLY

Figure 8





SWING VERTICALLY

DATE OF ISSUE: 4-20-83

RGB-1401

POWER SUPPLY CIRCUIT DESCRIPTION

GENERAL: The B+ power supply uses a precision voltage regulation IC87 (LM723) which supplies the signal for controlling the series regulation transistor D99 (2SC105DE). The line voltage is rectified by a full wave bridge rectifier FLW181 (FLW200) converting the 110 VAC into 160 VDC. Fold back current limiting (600 mamps) is provided using R176 (1.2 ohm, 1 watt wirewound) as a sensing element. Fuse F174 (1 amp slow blow) protects against shorts in the bridge rectifier, filter capacitors or degaussing circuits.

CONTROL SUPPLY: The power supply control circuit is powered by a 28 volt source. The 160 VDC is reduced to 28 volts using resistor R90 (22K, 1 watt) in series with Z91, a 28 volt Zener diode (IN5256A).

VOLTAGE REFERENCE: The LM723 (IC87) has a built-in buffered 7.15 volt reference voltage.

CONTROL AMPLIFIER: The 7.15 volt reference is connected to the input of an internal operational amplifier (LM723). The (-) input to the operational amplifier is connected to a precision resistor divider (71.5K, 475K) network located on PRA84 (Precision Resistor Array). An internal op-amp compares voltage variations in the +122 volt line to the internal 7.15 volt reference and feeds the difference to an internal transistor emitter follower (LM723). The error, or difference, is fed through a 6.8V Zener to a pre-drive NPN amplifier Q96 (MPSA42). The error signal is further amplified by the driver PNP amplifier Q94 (MPSA92) to control the series pass transistor Q99 (2SC1050E). Diode D95 (1N4005) protects the series pass transistor in case of a supply voltage short. Fusible resistors R92 (1K) and R94 (100 ohm) are used in the pre-driver Q94 (MPSA92) for protection.

CURRENT LIMIT: The LM723 has an internal NPN transistor designed for current limit. Its base is biased to .62 volts by diode D88 (1N914). The emitter is connected to the current sense resistor R176 (1.2K ohm, 1/2 watt wirewound), to an 82K bias resistor, and a 120K fold back resistor. The 82K bias resistor establishes the start-up limit current for the +122 volt line when it is grounded (.25 amp). The 120K fold back resistor increases the limit current by .36 amps when the +122 volt line is stabilized. The current limit at +122 volts is .25 amps + .36 amps or .6 amps.

STABILITY: The output of the power supply is stabilized by C71 (220 mfd @ 200 V). The control amplifier is stabilized by C86 (120 pfd). The power supply will maintain a regulated output of +122 volts DC with a low line voltage of 99 VAC.

VERTICAL DEFLECTION SYSTEM

GENERAL: The vertical deflection system accepts vertical sync in the range of 38Hz and converts it to the necessary current to drive the vertical deflection yoke. The circuit includes a vertical oscillator IC124 (NE555), a ramp generator, a drive amplifier IC108A (LM324) and summing DC restore amplifiers IC108B and C (LM324), and the output drive pair Q135 (2SC478) and Q134 (2SC478). IC108D functions as a vertical blanking amplifier.

VERTICAL SYNC: The vertical sync signal is passed through a filter which eliminates noise. The filter output is connected to the threshold input of the vertical oscillator IC124 (NE555). The sync filter will pass vertical sync pulses that are 40 micro-seconds or wider.

VERTICAL OSCILLATOR: The vertical oscillator IC124 (NE555) is the basic timing element. Capacitor C126 (.68 mfd, 5%) is connected to the trigger input of IC 124 (NE555). It is also connected to the threshold input via the sync filter.

RAMP VOLTAGE: Capacitor C126 (.68 mfd, 5%) receives its charging current from Q128 (2N3638/2N3906). This current produces a timed ramp voltage. When the ramp voltage exceeds 8 volts, IC124 discharges capacitor (C125) to 4 volts via a 377 ohm, 1% resistor (thick film) which is one free running vertical cycle (24 milliseconds).

SYNC: The ramp time is shortened to 16.6 milliseconds when vertical sync is added to the ramp.

RAMP GENERATOR: The ramp generator includes a voltage independent current source which has a constant current component and a variable current proportionate to the negative ramp voltage. The constant current component is produced by a 77K resistor, 1% (thick film) to DC ground. The variable component comes from the current feedback of the Vdy, through R121 (4.7 ohm, 1/2 watt).

LINEARITY COMPARISON: The variable current component which compensates for raster nonlinearity is produced in conjunction with the DC restore IC108C. Transistor Q128 (2N3638/2N3906) base to emitter temperature compensation is accomplished by transistor Q127 (2N3638/2N3906).

RAMP BUFFER: The ramp voltage is buffered by an operational amplifier IC108A (LM324) which has unit gain.

SIZE CONTROL: The buffered ramp signal passes through a variable attenuator network. The output of the network is compared against the vertical deflection (Vdy) current, controlling the Vdy current which adjusts the vertical size.

CURRENT MODE: The (+) input of IC108B acts as a current mode since the output amplifier (Q135 and Q134) inverts the output of IC108B.

CURRENT SUMMING: The current from the attenuated ramp voltage across a 10K resistor must equal the current across second 10K resistor which is proportional to the Vdy feedback current. This current summing across the two 10K resistors completes the current feedback for the Vdy amplifier.

DC RESTORE: The DC must be restored since the Vdy output amplifier is capacitively coupled to ground by C8 thereby eliminating any DC reference. The DC reference is required to stabilize vertical raster position. The voltage to the (-) input of the summing amplifier IC108C comes from the attenuated DC output of the vertical amplifier. The output of the vertical amplifier is divided by a 270 ohm and an 82K resistor integrated by C5 (2.2 mfd) and compared to an 8 volt reference by IC108C. The output of IC108C is divided by a 1K and 2.7K resistor which sets the bias for the summing amplifier. This completes the voltage feedback for the Vdy output amplifier.

LINEARITY: This type of DC restore circuit introduces some nonlinearity into the Vdy feedback current because the integrator time constant must be infinite for the system to be stable. It would take an infinite time constant to produce an exact DC feedback voltage for perfect linearity. Fortunately, this effect can compensated for by a simple ramp nonlinearity. The ramp nonlinearity is produced by increasing the charging current to C126 as its voltage increases.

OUTPUT AMPLIFIER: The output amplifier is a common emitter amplifier with a collector load emitter follower. The base of the common emitter amplifier is driven by IC108B through a 470 ohm current limit resistor. The collector load which supplies the drive current for the emitter follower is coupled to the output via C129 which permits the amplifier output to reach the supply voltage. This also improves the efficiency over a simple collector load amplifier.

STABILITY: To voltage stabilize the amplifier, a 120 pfd capacitor C9 is used for voltage negative feedback. To current stabilize the loop a .002 mfd capacitor is added across the Vdy. Resistor R145 (1.5K, 1/2 watt) provides damping for the vertical deflection yoke.

VERTICAL POSITION ADJUSTMENT: Vertical positioning is accomplished by injecting a DC bias current into the vertical yoke from ground which shifts the picture up. Resistor R31 (5K, 3/4 watt ceramic pot) provides adjustment. A 47 volt Zener diode Z109 (1N977A) protects R31 and R148 (1K, 2 watt) resistors by preventing the output from going high during a fault condition.

BLANKING AMPLIFIER: Vertical blanking is derived from the output of the vertical oscillator NE555 (IC124). The output pulse from the NE555 is approximately 100 micro-seconds starting a beginning of vertical sync. LM324 (IC108D) operates in conjunction with C112 (15 mfd) to stretch this pulse to approximately 1 milli-second. Two 1N914 diodes clamp the vertical blanking pulse to ground reference.

PIN CUSHION CORRECTION CIRCUIT: An active pin cushion correction circuit is provided to compensate for pin cushion distortion inherent in the vertical deflection yoke. The compensating signal is derived from the output of the Ramp Buffer Amplifier and the output of the Vertical Deflection Amplifier via a 10 mfd capacitor and a 2.2K resistor. The correction signal, in the form of a parabola, is current amplified and drives a saturable core transformer modifying the horizontal sweep width.

HORIZONTAL DEFLECTION CONTROL

GENERAL: The HDC includes a variable horizontal sync delay for horizontal picture positioning, an oscillator and a high voltage shutdown circuit. The circuit operates as a direct drive sync system when sync is present. The absence of sync allows the oscillator to run at a nominal 15KHz to sustain the monitor operation. The horizontal sync is amplified by Q130 (MPSU10) and coupled to the base of the horizontal drive transistor Q142. (2SD899A) through drive transformer T141.

HORIZONTAL POSITION: The horizontal sync is fed to a dual one-shot IC67 (74LS221). The first one-shot provides a time delay of approximately on half horizontal line, adjustable +/- 20%. This is accomplished by conventional techniques using (C62) .0056 mfd +/- 2% in conjunction with resistor R64 (7.5K). The delay is adjustable by varying the bias volts on copacitor C62 through R61 (18K) and R30 (1K Pot). The second one-shot operates in a similar manner using a 8.2K resistor C72 (.0056 +/- 2% polyethylene) providing a fixed half line delay. Shifting the time of the horizontal sync causes the picture to move to the right or left. Polyethylene capacitors are used to minimize temperature drift. The fixed time delay one-shot also functions as a sync detector to inhibit the oscillator when sync is present.

HORIZONTAL OSCILLATOR START SUPPLY VOLTAGE: The horizontal oscillator requires starting power from a source other than power derived from the flyback system. The NE555 and the NE393 are supplied power from the bias Zener diode 244 (1N755, 7.5V) used in the RGB Video Amplifiers.

HORIZONTAL OSCILLATOR: The horizontal oscillator IC72 (NE555) functions as the basic timing element. In the abscence of horizontal sync the oscillation will operate exactly at or slightly above 15KHz. This accuracy is essential since the EHT increases as horizontal drive frequency decreases. The accuracy is accomplished by using precision resistors and capacitors.

SYNC DETECTOR: Sync detection is accomplished by allowing the output of the set timer via resistor an 8.2K resistor to charge C78 capacitor (2.2 mfd). When the horizontal sync is present, the voltage on C78 will be higher than when the IC66B is timed out. This detector voltage is applied to the FM input of IC73 (NE55) and raises its frequency to 15KHz when no horizontal sync is present.

FREQUENCY ACCURACY: The oscillator frequency is controlled by capacitor C75 (.0056 mfd, +/- 2%) and resistors 10.5K and 6.04K +/- % located on PRA 71. Diode D74 (1N914) produces an output symmetry, opposite of the normal NE555 oscillator symmetry.

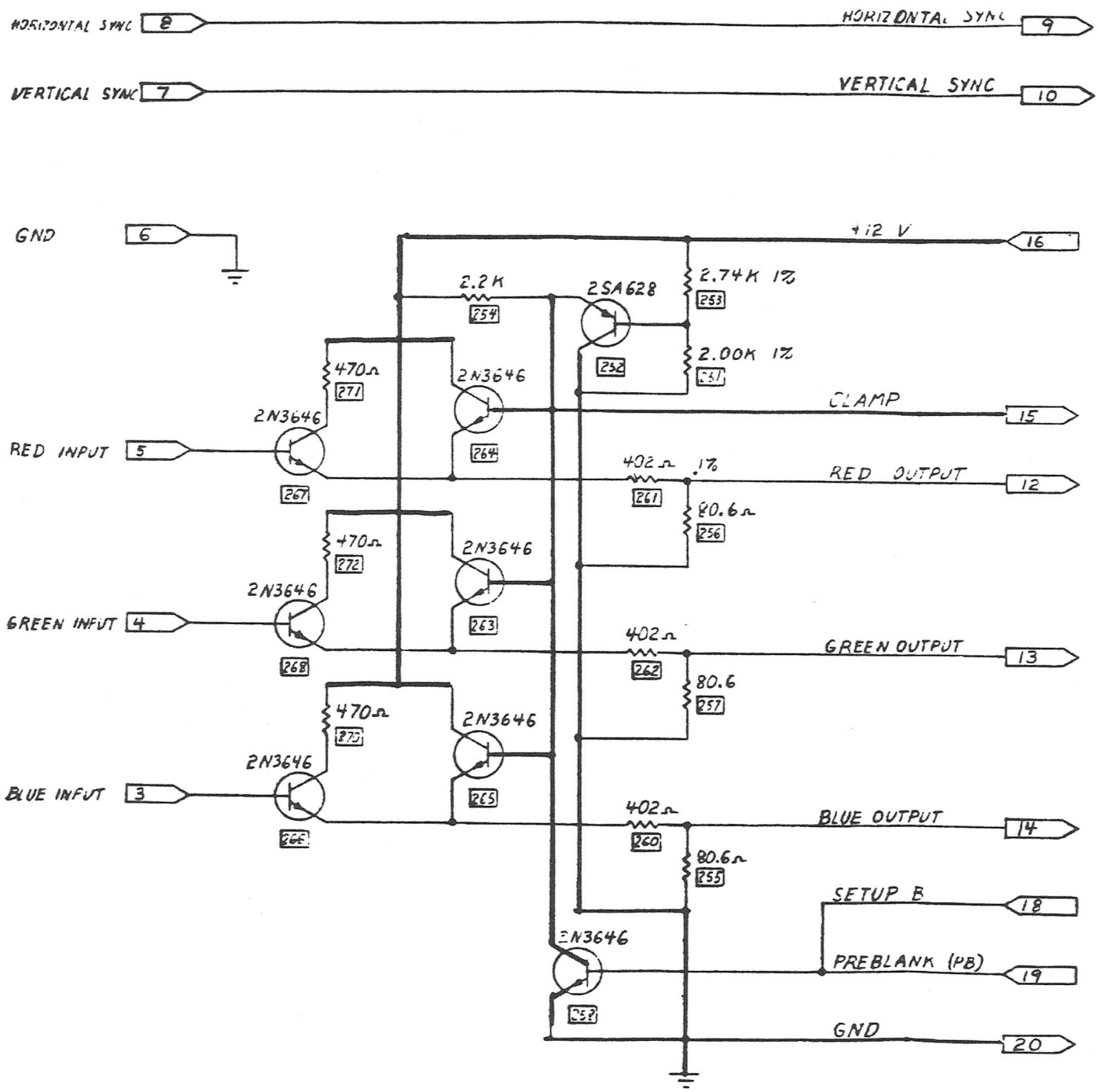
HORIZONTAL DRIVE: The output of IC73 (NE555) drives Q130 (MPSU10). When the output of the NE555 is high, Q130 is turned on which turns the horizontal drive transistor Q142 (2SD899A) off through transformer T141 causing retrace to occur.

HORIZONTAL DRIVE TRANSFORMER: Since Q142 has a beta of about 8, the drive transformer must supply a minimum of 300mA. The horizontal drive transformer serves two functions, first, it matches the 122V line at 20mA to .8V at 300mA, and secondly, it protects the horizontal output transistor against oscillator malfunction.

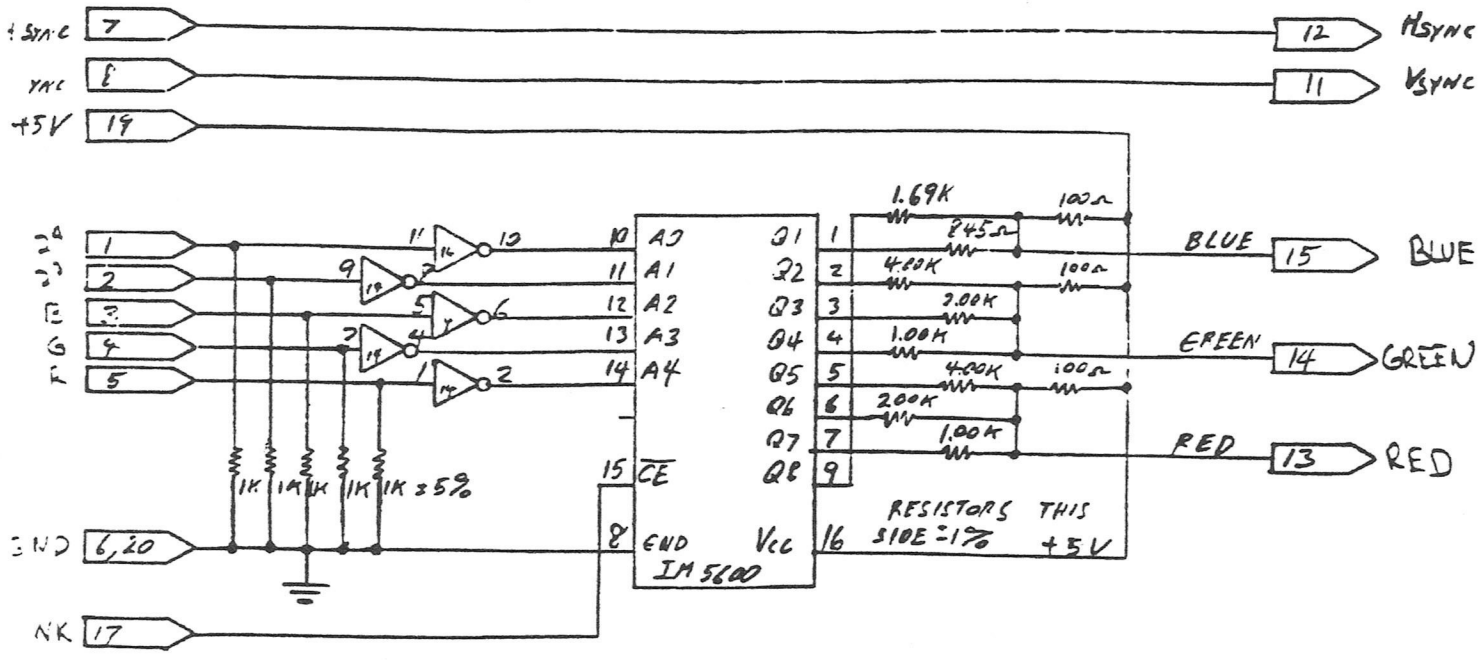
HIGH VOLTAGE (EHT) SHUTDOWN (X-RAY PROTECTION): The high voltage shutdown signal is sensed at the output of the flyback transformer. A signal of -112 volts DC is proportional to the EHT and is supplied to the high voltage shutdown circuit. The circuit uses IC76 A and B (LM393). Resistor R116 (71.5K, 1/2 watt) feeds the -112 volts signal to IC76A to be compared to +12 volts. If the -112 volt signal exceeds -126 volts or the +12 volt goes high, the output of IC76A goes low. This output is fed to IC76B.

IC76B functions to prevent noise and short time transients from activating the high voltage shutdown circuit. When the output of IC76A goes low for greater than .6 seconds, determined by the time constant of R72 and C80, IC 76B goes low and resets the horizontal oscillator IC73 (NE555). This stops the horizontal oscillator and shuts down the high voltage. The circuit remains in this state since the -12 volts and -112 volts are missing.

ANALOG IGT


HORIZONTAL SYNC
8
HORIZONTAL SYNC
9
VERTICAL SYNC
7
VERTICAL SYNC
10
GND
6
+12 V
16
2.2K
254
2SA628
2.74K 1%
253
2.00K 1%
251
252
470Ω
271
2N3646
CLAMP
15
2N3646
RED INPUT
5
264
402Ω 1%
RED OUTPUT
12
267
261
80.6Ω
256
470Ω
272
2N3646
2N3646
GREEN INPUT
4
263
402Ω
GREEN OUTPUT
13
268
262
80.6
257
470Ω
275
2N3646
2N3646
BLUE INPUT
3
265
402Ω
BLUE OUTPUT
14
266
260
80.6Ω
255
SETUP B
18
2N3646
PREBLANK (PB)
19
258
GND
20

3 & 4 LINE DIGITAL



RGB 1401A CRT Display Power Distribution

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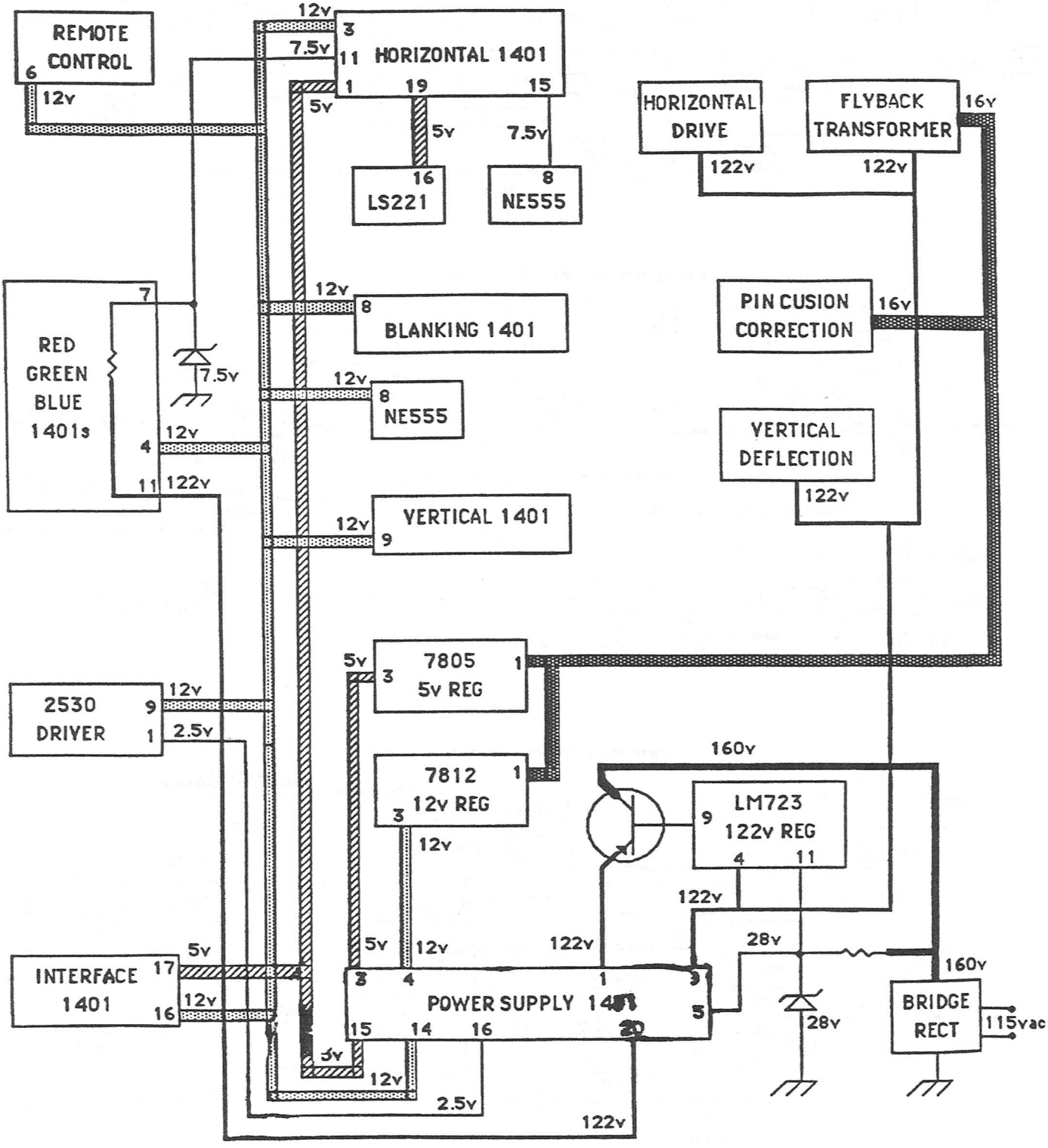
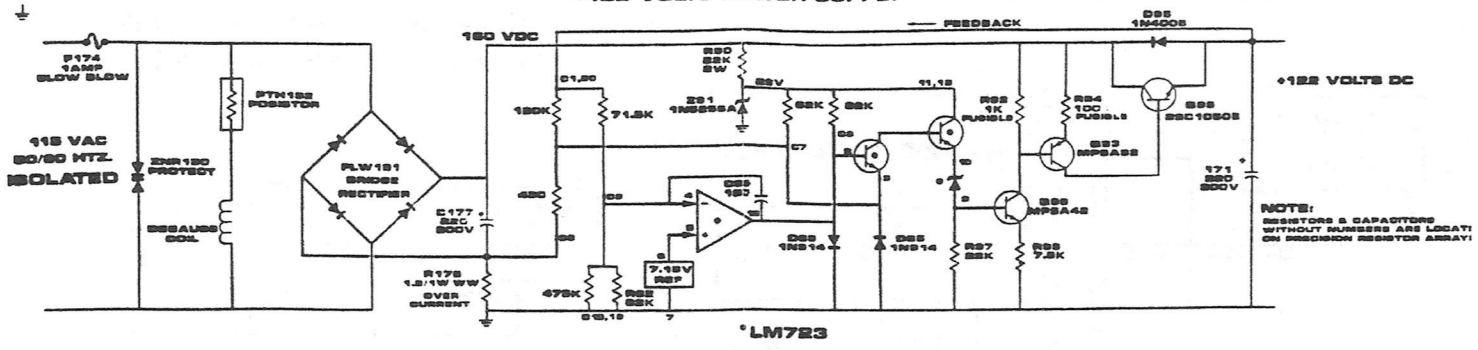
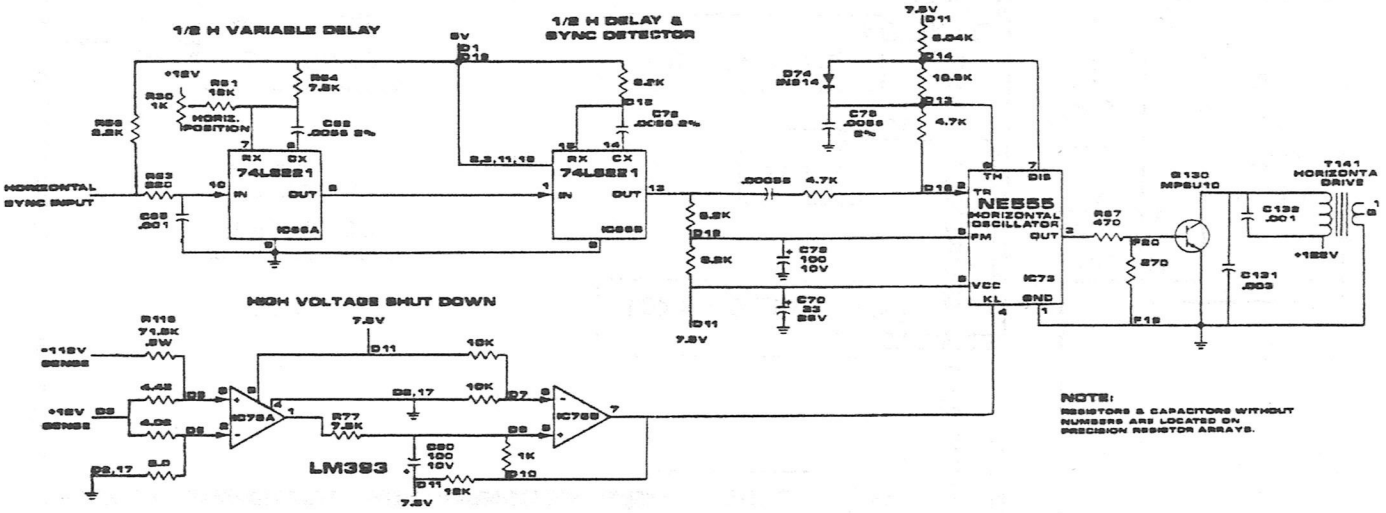


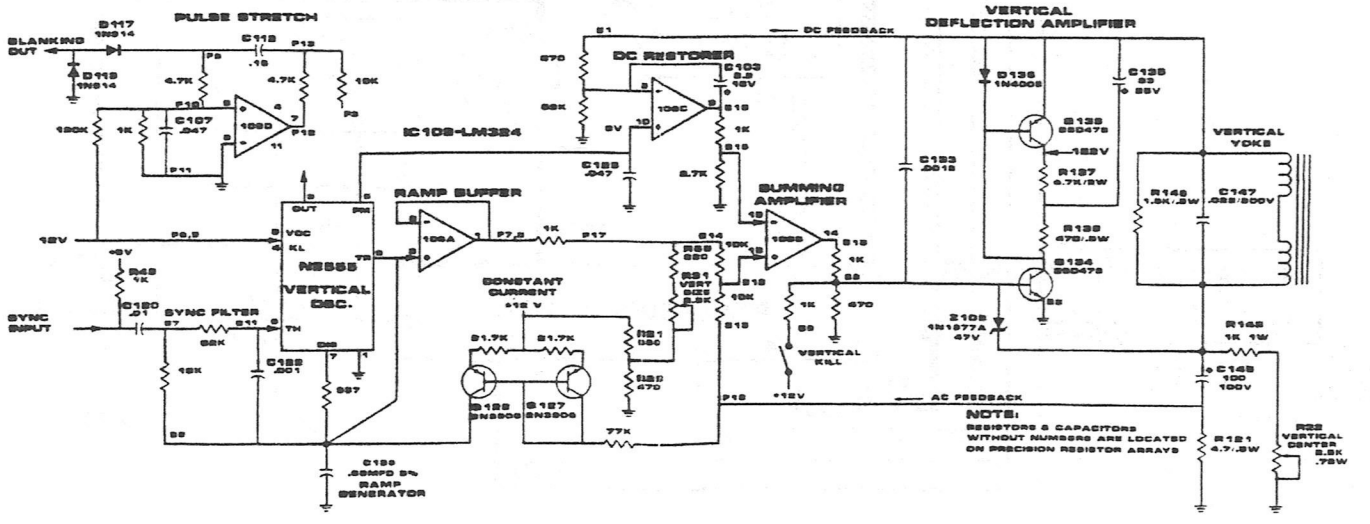
+122 VOLTS POWER SUPPLY

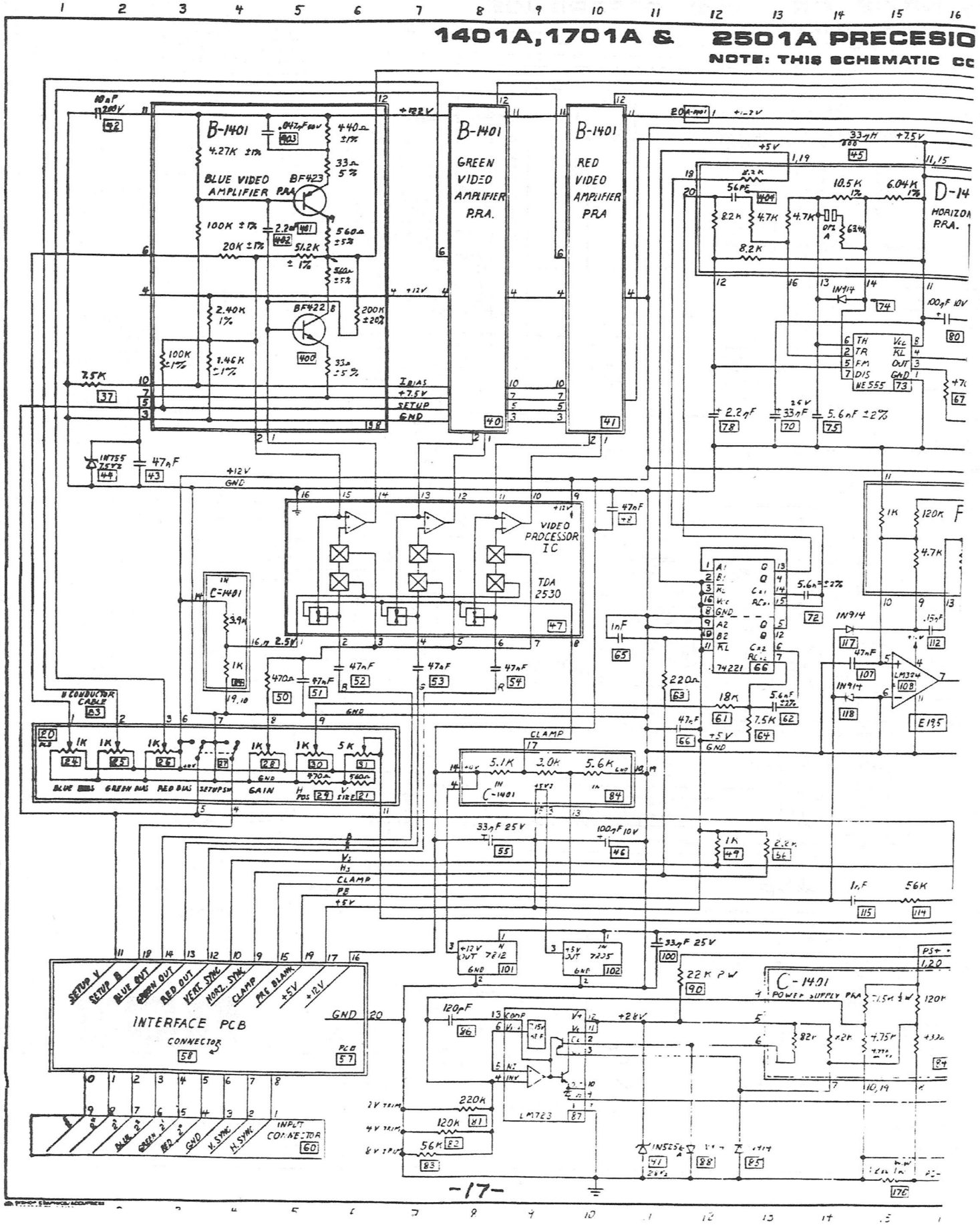


HORIZONTAL DEFLECTION CONTROL



VERTICAL SWEEP AND DEFLECTION




1401A,1701A & 2501A PRECESIO
NOTE: THIS SCHEMATIC CC
B-1401
BLUE VIDEO AMPLIFIER P.R.A.
B-1401
GREEN VIDEO AMPLIFIER P.R.A.
B-1401
RED VIDEO AMPLIFIER P.R.A.
VIDEO PROCESSOR IC
TDA 2530
INTERFACE PCB
CONNECTOR
INPUT CONNECTOR
BLUE BIAS
GREEN BIAS
RED BIAS
SETUP SW
GAIN
H POS
V SIZE
CLAMP
+12V
+5V
GND
-17-

ION RESISTOR ARRAY REFERENCE

CORRECT FOR PRA'S ONLY

REVISIONS				
LTR	ECN	DESCRIPTION	BY	DATE
A		CHANGED MA1135 TO 555+324	TW	11/17/80
B		UPDATED RESISTOR VALUES	TW	12/1/80
C		UPDATED SCHEMATIC 20pin PRA'S	TW	2/24/81
D		CHANGED V_{VERT} RANGE TO 50-60 Hz	TW	3/5/81

NOTES:
1. ALL RESISTORS ¼ W, 5% UNLESS OTHERWISE NOTED.
2. 34 RGB 1401 MAIN PCB.

DEGAUSSING COIL 4

GND

7 SCREEN

FOCUS

1

-1401 HORIZONTAL PRA

12K 1K 10K 10K 4.02K 2.00K 4.42K 14.9K OPT. B 71

+12V +75V -112V -45V

71.5K ±W 116

7.5K 77

LM393 76

4.7K 2W 140

33nF 200V 132

MPS U10 130

2SD899 142

3.9nF 1.6KV 150 3.9nF 1.6KV 151

1nF 1KV 131 141

+122V

FBT

.062nF 1KV 11 .01nF 1.6KV 15

470K ±W 13

GFA03R 8

2M Ω 12

3.3K 1W 10

1M Ω 14

FIL 10

F1 F2 7 PCB

DY1 DY2 DY3 DY4

HDy 2

VDY ¼W 1.5K 146 1KV .0012nF 147

10nF 1KV 16F 10nF 1KV 170

V260052 172

1N4005 163

47mH 680Ω 161 162

33nF 400V 153

1K 2W 148

2.7K 2W 154 152

220pF 1KV 157

1.2Ω 169

156

F-1401 VERTICAL PRA

21.5K 1% 21.5K 1% 2.2K 470Ω 4.7K 10K 270Ω 77K 1% 1KΩ 47Ω 104

PN3638 127 PN3638 128

+16V

DFA05E 113

PCT 2370531

1nF 1KV 106

33nF 129 25V

105 143

47Ω 121

VI PB RESISTOR

10nF 1KV 145

VPOSITION 5K ¼W 32 PART OF 20 REMOTE PCB

DFA05E 158

.1nF 160 1.2W

2.2K 111 4.7nF 1KV 144

IN977A 47V 109 +22V

LM555 124

LM324 108

.68nF ±5% 126 1nF 122

47nF 125

8.2nF 103

337Ω 18K 82K 10KΩ 10KΩ 1KΩ 2.2K 1KΩ 8.2K 270K .7pF 123 +70Ω 1K

VRAMP VZ PB

.1nF 20

220Ω 69

33nF 25V 135 4.7K 2W 137

470Ω ½W 139

120pF 1KV 133

2SD 478C 134 2SD478C 138

IN4005 136

1KΩ 92 100Ω 94 95 93 2SC1350E

220nF 200V 177

MPSA42 96

FAST TRANSISTOR 99

97 98

FLW200 181

D62 D61 1A SLO-BLOW 17

ZNR K241 180

PTH 451A 182

115 VAC 60 Hz

DO NOT SCALE DRAWING

RGB

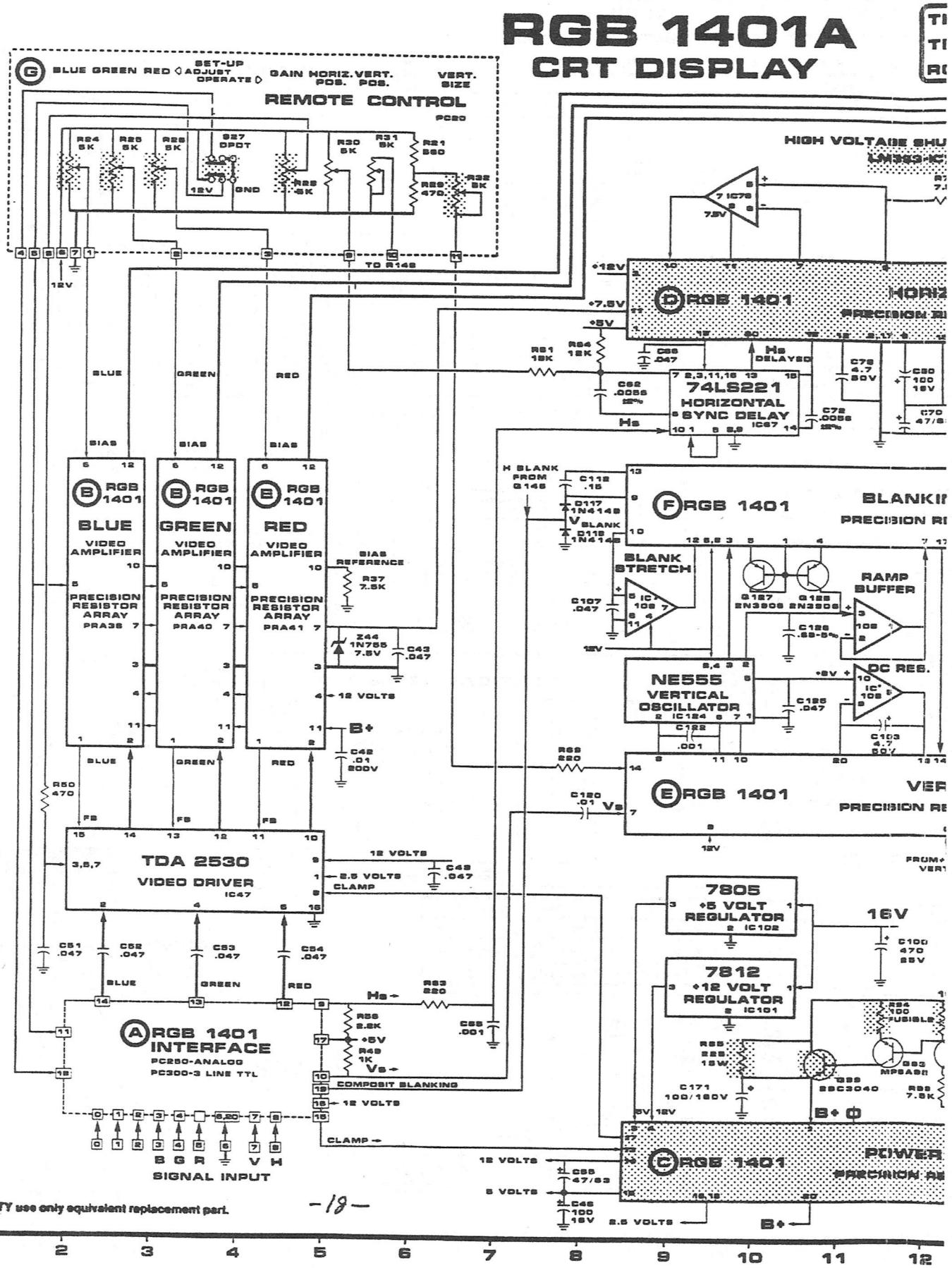
LAKE OF THE PINES INDUSTRIAL PARK · AUBURN, CA · 95603 · USA

9/18/80

D | RGB 1401 DISPLAY MONITOR SCHEMATIC | S01D0001- | D

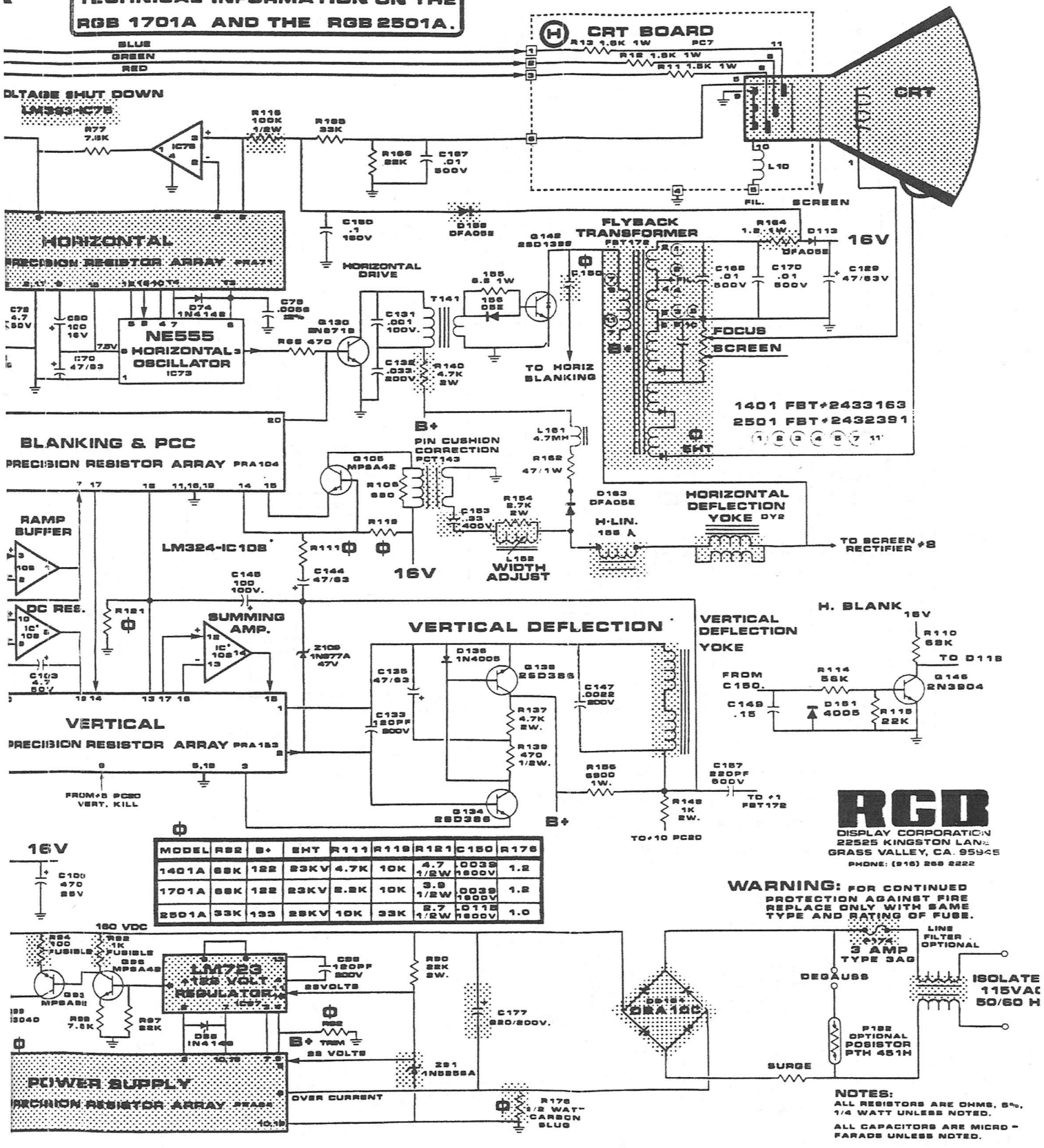
SHEET 1 OF 1

RGB 1401A
CRT DISPLAY



For SAFETY use only equivalent replacement part.

THIS SCHEMATIC INCLUDES TECHNICAL INFORMATION ON THE RGB 1701A AND THE RGB 2501A.

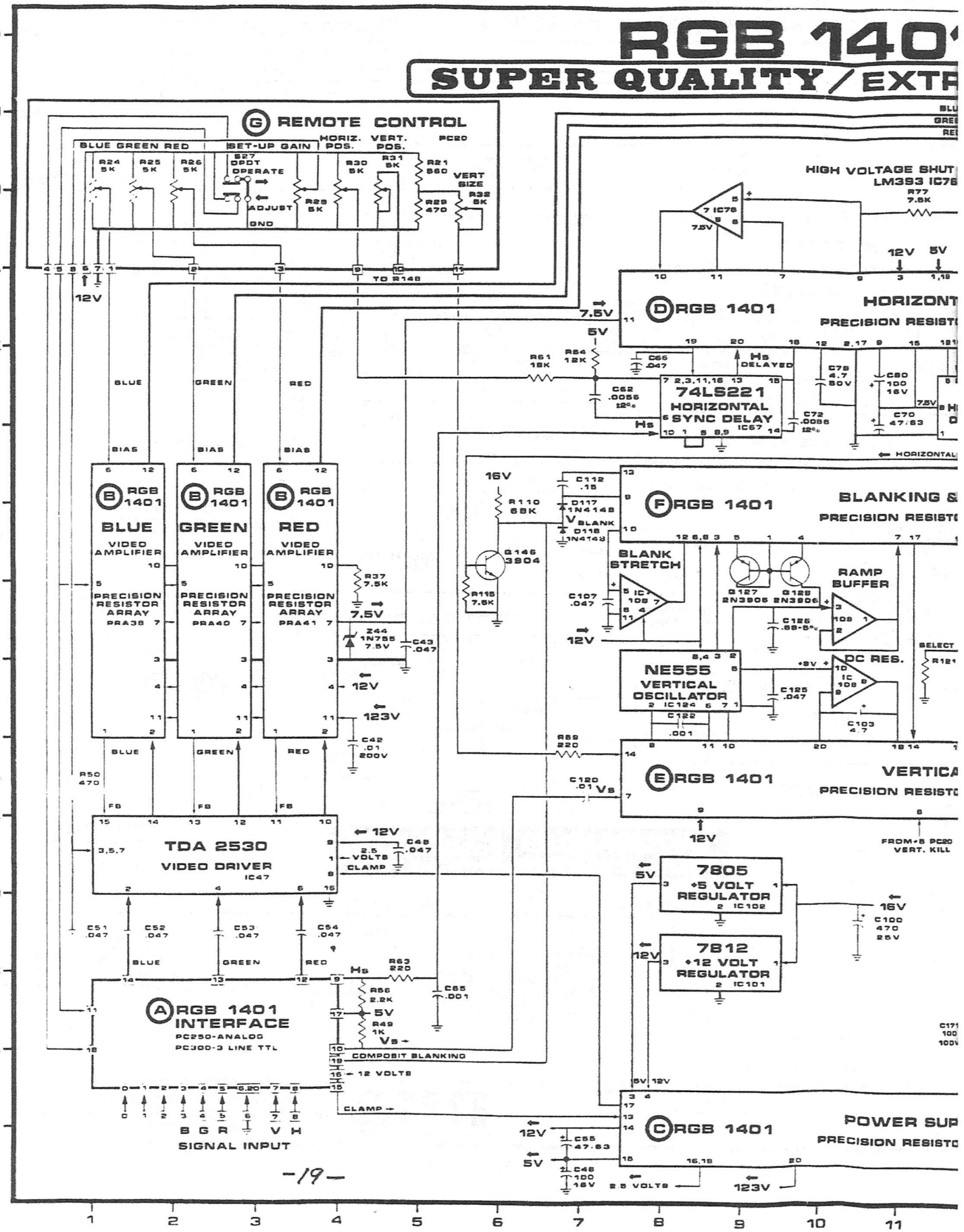


MODEL	R82	B+	EHT	R111	R119	R121	C150	R176
1401A	68K	122	23KV	4.7K	10K	4.7 1/2W	.0039 1600V	1.2
1701A	68K	122	23KV	2.2K	10K	3.9 1/2W	.0039 1600V	1.2
2501A	33K	133	29KV	10K	33K	2.7 1/2W	.0115 1600V	1.0

NOTES:
ALL RESISTORS ARE OHMS, 5%, 1/4 WATT UNLESS NOTED.

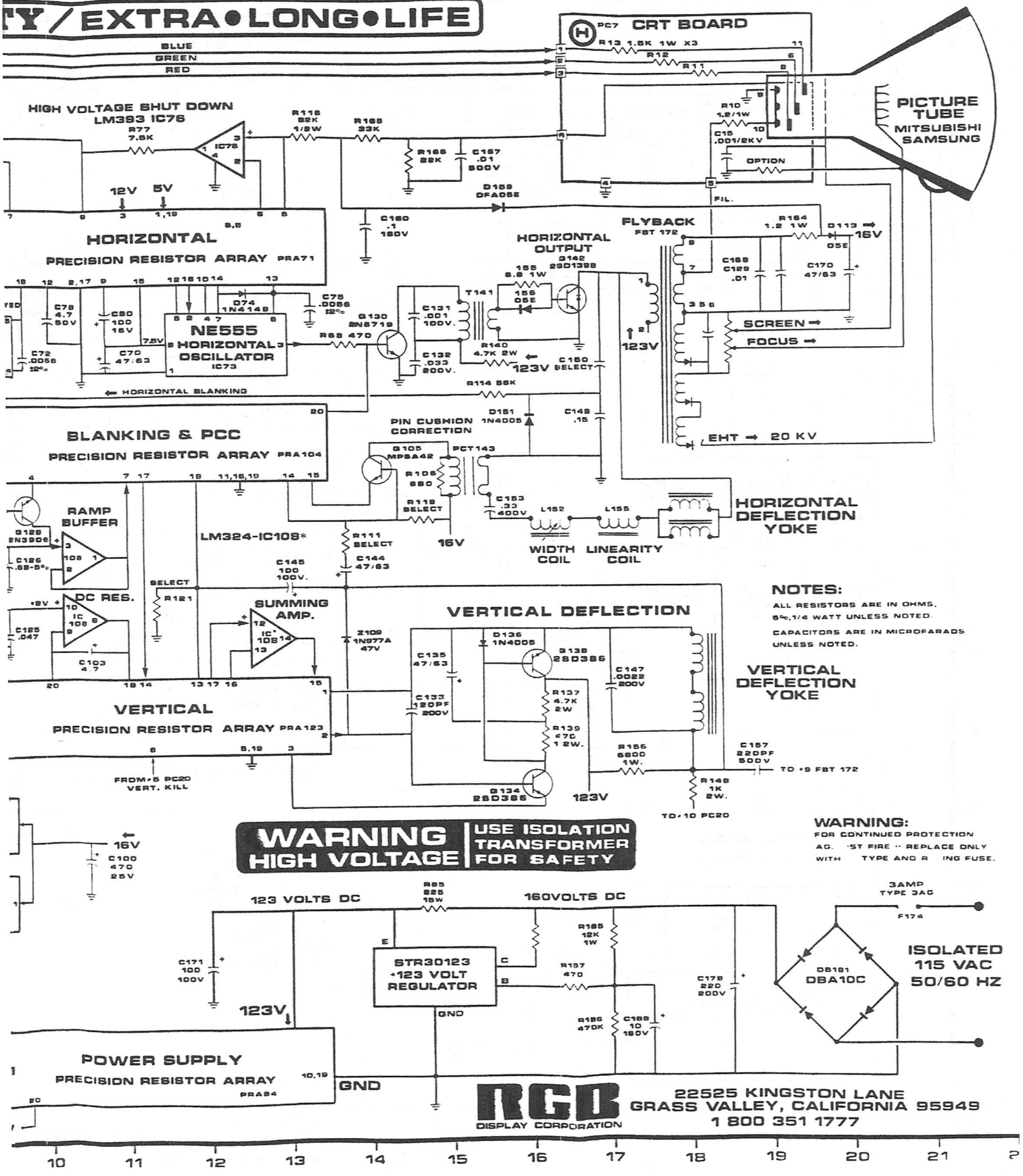
ALL CAPACITORS ARE MICRO-FARADS UNLESS NOTED.

12 13 14 15 16 17 18 19 20 21 22 23


RGB 140
SUPER QUALITY / EXTR
G REMOTE CONTROL
BLUE GREEN RED
SET-UP GAIN
HORIZ. POS.
VERT. POS.
PC20
R24 5K
R25 5K
R26 5K
S27 DPDT OPERATE ADJUST GND
R28 5K
R30 5K
R31 5K
R21 560
R29 470
VERT SIZE
R32 5K
TO R148
12V
HIGH VOLTAGE SHUT
LM393 IC76
R77 7.5K
7.5V
12V 5V
D RGB 1401
HORIZONT
PRECISION RESIST
5V
R61 18K
R54 12K
C66 .047
C52 .0056
Hs DELAYED
74LS221
HORIZONTAL SYNC DELAY
IC67
Hs
C72 .0056
C79 4.7 50V
C80 100 16V
C70 47/63
HORIZONTAL
BLUE
GREEN
RED
BIAS
B RGB 1401
BLUE
VIDEO AMPLIFIER
PRECISION RESISTOR ARRAY
PRA38
B RGB 1401
GREEN
VIDEO AMPLIFIER
PRECISION RESISTOR ARRAY
PRA40
B RGB 1401
RED
VIDEO AMPLIFIER
PRECISION RESISTOR ARRAY
PRA41
R37 7.5K
Z44 1N755 7.5V
C43 .047
12V
123V
C42 .01 200V
R50 470
FB
TDA 2530
VIDEO DRIVER
IC47
3,5,7
2.5 VOLTS CLAMP
C48 .047
C51 .047
C52 .047
C53 .047
C54 .047
R63 220
C65 .001
R56 2.2K
R49 1K
5V
Vs
A RGB 1401 INTERFACE
PC250-ANALOG
PC300-3 LINE TTL
COMPOSIT BLANKING
12 VOLTS
CLAMP
B G R V H
SIGNAL INPUT
16V
R110 68K
C112 .15
D117 1N4148
V BLANK
D118 1N4148
Q145 3904
R115 7.5K
F RGB 1401
BLANKING &
PRECISION RESIST
BLANK STRETCH
IC
C107 .047
Q127 2N3906
Q128 2N3906
RAMP BUFFER
C125 .68-5%
NE555
VERTICAL OSCILLATOR
IC124
C122 .001
C125 .047
DC RES.
SELECT
C103 4.7
R89 220
C120 .01
Vs
E RGB 1401
VERTICA
PRECISION RESIST
FROM +5 PC20
VERT. KILL
7805
+5 VOLT REGULATOR
IC102
7812
+12 VOLT REGULATOR
IC101
C100 470 25V
C171 100 100V
C RGB 1401
POWER SUP
PRECISION RESIST
C55 47.63
C46 100 16V
2.5 VOLTS
123V
-19-

1401B

TY / EXTRA • LONG • LIFE



10 11 12 13 14 15 16 17 18 19 20 21